



PRELIMINARY PATHWAY ANALYSIS REPORT

RAHKONEN DRUMS
CERCLIS ID# UTD981545981

Prepared For:

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION VIII

CONTRACT NO. 68-W9-0025

WORK ASSIGNMENT NUMBER: 32-8JZZ

September 29, 1993



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APPROVAL PAGE

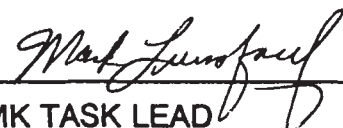
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9/29/93

DATE



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9/29/93

DATE



EPA SITE ASSESSMENT MANAGER

9/30/93

DATE

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1.0 INTRODUCTION

This Preliminary Pathway Analysis (PPA) report of Rahkonen Drums, UTD981545981, located in Brigham City, Box Elder County, Utah, was prepared in partial fulfillment of work assignment number 32-8JZZ issued to the Morrison-Knudsen Corporation - Environmental Services Division (MKES)/ICF Technology Incorporated (ICF) by the Region VIII office of the U.S. Environmental Protection Agency (EPA).

2.0 SITE DESCRIPTION

2.1 Site Location

The Rahkonen Drums Site (RDS) is located on the western edge of Brigham City, Utah (Figure 1). The street address is 112 South 800 West, Brigham City, Utah (Ref. 2). RDS is located in the NE $\frac{1}{4}$, NE $\frac{1}{4}$ of Section 23, Township 9 north, Range 2 west (Ref. 5). The site coordinates are 41° 30' 34.7" north latitude and 112° 01' 33.9" west longitude (Ref. 2). The site lies approximately 4 miles to the northeast of Willard Bay of the Great Salt Lake (Ref. 5).

2.2 Site History

The RDS is privately owned by Mr. Arnold Thompson and Mr. John Peterson. Mr. Thompson's address is 753 Sunset Drive, Brigham City, Utah 84302 [Phone: (801) 723-7894]. Mr. Peterson's address is 889 West 800 South, Brigham City, Utah 84302 [Phone: (801) 723-5136]. The operator of the site is Mr. John Rahkonen of 2766 North 1050 East, Ogden, Utah 84404 [Phone: (801) 731-1120] (Ref. 2).

The property covers approximately 8 acres, most of which are open fields and old buildings (Figure 2). The old buildings were once used in a cannery business (thought to be in operation in 1946) (Ref. 2). Concept Industries and Associated Manufacturing, a cabinet producer, has also used buildings onsite (time frame unknown) (Ref. 3). The U.S. Geological Survey 7½ minute topographic maps of the site (Ref. 7) show that the number, shapes and sizes of the buildings have increased and decreased through the years. The area on Figure 2, referred to as the Old Cannery Building is the area where the changes to the structures have occurred.

Currently, the site is used for drum storage, along with a brine shrimp operation and a welding shop (Ref. 2). The drum storage is operated by Mr. Rahkonen, in leased space (Ref. 2). He buys drums containing surplus materials from Morton Thiokol, then resells the materials under the company name Propulsion Dynamics. Mr. Rahkonen began storing drums at the site in 1983 (Ref. 3).

On October 21, 1987 a Preliminary Assessment (PA) for the site was prepared by Michael Long of the Utah Department of Health, Bureau of Solid and Hazardous Waste (BSHW). At that time the EPA believed No Further Action was necessary, but recommended involvement of the Emergency Response Branch of EPA, if the drums were not removed from the site (Ref. 1).

During a BSHW site visit on January 5, 1990, two separate drum storage areas were observed on the west side of the old cannery building. A northern area had approximately 800 55-gallon drums stacked two high on wooden pallets on a "cement" (probably concrete) slab. A southern area had approximately 75 55-gallon drums, some of which drums were bulging and corroded (Ref. 3). Berms or other impounding structures were not present in the drum storage areas (Ref. 1). The overall size of these two areas is not known. However, based on examination of site maps and photographs, the area appears to cover 174,240 square feet (Ref. 2).

Many of the drums in the northern area were oozing a black tarry substance that had pooled around the base of the stacked drums. The pooled material blanketed the ground surface making it unclear whether the drums were all on the "cement" slab or partially sitting directly on the soil (Ref. 3).

Another area of suspected contamination is referred to by the owner as the "tar pit", located west of the south end of the old cannery building. Allegedly a fuel spill occurred at this location during the operation of the cannery (Ref. 3). The areal extent of the spill is not known. However, from examination of site maps and photographs, the "tar pit" appears to be about 50 square feet. This "tar pit" was not in an impounded area nor was the area lined (Ref. 1). The substance appeared to be a congealed tar-like material. According to the owner, the area of the "tar pit" was excavated and removed to the County Landfill. In addition, the soil surrounding the area had been disked. This implies aeration of the soil that would have assisted in the removal of Volatile Organic

Compounds (VOCs). During the BSHW site visit remnants of the "tar pit" were still visible (Ref. 3).

3.0 PHYSICAL SETTING

3.1 Geology

The RDS lies on the western edge of an alluvial fan west of Brigham City. The alluvial fan flows out of Box Elder Canyon of the Wellsville Mountains. The gradient across the site is half an inch per foot. The fan consists of coarse clastic material at the mouth of the canyon decreasing to fine sand and silt size particles at the edge of the fan. The rock material washing down from the Wellsville Mountains of the Wasatch Mountain Range consists of metamorphic rocks, limestone, dolomite and other minor sedimentary deposits of Precambrian to Pennsylvanian in age. The maximum valley fill depth in the Lower Bear River Drainage Basin is suspected of being about 8,000 feet through the use of geophysical surveying (Ref. 3).

The valley fill material consists of alluvium and colluvium mixed with Lake Bonneville marginal deposits (lake shore, fan and delta deposits) of Quaternary age. Deposits consist of well to poorly sorted boulders, cobbles, gravel, sand, silt and travertine (Ref. 3).

Soil borings were drilled to a maximum depth of 44 feet and logged by Ecology and Environment, Inc., for the Utah Division of Environmental Response and Remediation (DERR), at Rahkonen Drums in March, 1991. The soil boring logs show fine to very fine sands with varying concentrations of gravel and silt for the entire stratigraphic section drilled. Textural changes in the stratigraphic sequence are subtle with slight increases or decreases of silt or pebbles. Minor color changes from buff to tan to light brown are a natural record of subtle changes in the stratigraphic sequence. Orange staining was observed at depths of 15 and 20 feet at RD-MW-1; at 0.4 to 24 feet at RD-MW-2 and at 9 to 21 feet at RD-MW-3 (Ref. 4). This orange staining may represent stratification, the oxidation of iron bearing minerals, and/or a fluctuating water table through time.

3.2 Hydrogeology

A study characterizing the aquifer system underlying the site has not been conducted. Therefore, the underlying aquifer system is considered undefined. The regional aquifer

system of the Lower Bear River Drainage Basin is directly affected by the alluvial and deltaic deposits in the Brigham City area. These types of deposits can create confined and unconfined conditions of limited areal extent that are generally impossible to predict. These deposits contain several hundred feet of saturated, highly permeable gravel and sand (Ref. 3). Insufficient information is available to determine the thickness of the aquifer.

The ground water is derived from three sources: (1) precipitation within the Bear River Drainage Basin, (2) surface water that enters the basin, and (3) subsurface inflow of ground water. The permeability of the soils at RDS are moderate, 10^{-4} to 10^{-6} cm/sec (Ref. 2). Ground water is generally less than 12 feet below the ground surface, however, seasonal fluctuation may occur. This fluctuation will not have any effect on the long term storage capacity. The direction of ground water flow is in question. Long term ground water elevation data have not been collected to accurately determine the direction of ground water flow and ascertain seasonal fluctuation. The Analytical Results Report (Ref. 2) states that the flow direction can vary from northeast to southwest, while the Sampling Report (Ref. 3) states the flow direction is to the west. Examination of U.S. Geological Survey topography maps suggest that the flow is most likely in a west to southwesterly direction towards the Great Salt Lake.

3.3 Hydrology

The site is located in the Lower Bear River Drainage Basin (Ref. 3). Run-off from the site flows to the west from the site through a ditch that crosses the property. This ditch empties into a second ditch that flows to the southwest along the railroad tracks (Ref. 2). This ditch that parallels the railroad tracks may enter the Black Slough, that empties into Willard Bay of the Great Salt Lake. However, the existing U.S. Geological Survey topographic maps of the area were inconclusive as to show a direct pathway between the site and the Black Slough. Ditches and intermittent streams were shown to disappear into the sediment (Ref. 5). A pathway may occur during seasonal flooding or through ground water resurfacing down gradient as springs. The nearest body of water to the site is a large constructed pond approximately 750 feet to the northeast in Watkins Park. The pond is used for recreation and aesthetics. This pond is not affected by run-off from the site. A ponded area or spring 3000 feet to the west and downgradient of the site is shown on U.S. Geological Survey topographic maps. This spring or ponded area may receive ground water from the site. Usage of this pond is not known.

Surface water in the area of the site is not used for potable purposes. This water may be used for irrigation and may also serve as a source of drinking water for wildlife in the area.

Numerous wetlands are located west of the site. The nearest wetland is located approximately 1 mile downgradient of the site. The Bear River Migratory Bird Refuge wetlands are about 4 miles west-southwest and downstream of the site (Ref. 3). The Harold S. Crane Waterfowl Management Area is located approximately 12 miles southwest and downstream of the site. Both the Bird Refuge and the waterfowl area are located in Willard Bay of the Great Salt Lake. These features are illustrated in Figure 3 (Ref. 5).

3.4 Meteorology

Temperature in the site area ranges from above 100°F during the summer seasons to sub-zero temperatures during most winters. The normal maximum temperature is 63.8°F and the normal minimum temperature is 38.6°F. Approximately 19 inches of precipitation occurs in the Brigham City area each year. The pan evaporation for the area exceeds 50 inches (127 centimeters) per year (Ref. 3). The 2-year, 24-hour rainfall estimate is 1.8 inches (Ref. 6).

The estimated daily wind value calculated for the area varies between 38 and 76 miles per day (1.6 and 3 miles per hour), depending on the time of the year (Ref. 3).

4.0 WASTE CHARACTERISTICS

4.1 Waste Quantity

During a site visit by the BSHW on January 5, 1990 two separate areas containing drums were observed. The drum areas are referred to as the north and south drum storage areas. These drum areas are located in an open field west of the old cannery buildings (Figure 2). Mr. Rahkonen began storing drums at the site in 1983 (Ref. 1).

The north drum storage area has approximately 800 (55-gallon) drums stacked two high on wooden pallets that sit on a "cement" slab. Many of these drums were oozing a black tarry substance in 1990 that pooled around the base of the stacked drums. The pooled material blanketed the ground surface making it unclear whether the drums were on the

"cement" floor or sitting directly on the soil. According to Mr. Rahkonen, these drums contain a substance known as HB Polymer (also known as PBAN or polybutadiene acrylonitrile polymer). The substance is an unvulcanized liquid rubber manufactured by American Synthetic Rubber Corp. of Louisville, Kentucky (Ref. 3).

The south drum storage area contains approximately 75 (55-gallons) drums sitting on a "cement" pad. Some of the drums are bulging and corroded. Labels on these drums include: R-45 polymer, aluminum powder, HC Polymer, Potassium Chloride, 2-ethylhexyl acrylate, tone polyol, HD calcium grease, dioctyl adipate, insulating electrical oil, Exxon turbo oil, N-Vinyl-2-pyrrolidone, and Union Carbide molecular sieves (Ref. 3).

The October 15, 1987 final PA lists the general contents of the drums found at site as follows:

Other Organic Chemicals:	780	55-gallon drums
Inorganic Chemicals:	4	55-gallon drums
Acids:	10	55-gallon drums
Heavy Metals:	5	50-gallon drums

The hazardous constituent and waste stream quantities for the drum sources may have been adequately determined from drum sampling conducted in 1990. The results of this sampling have not been obtained.

This property was used by an old cannery operation prior to its use as a drum storage site. A small area known as the "tar pit" is believed to have been associated with a fuel spill during the cannery operation (Ref. 1). The area was of an undetermined size. According to the owner the area of the "tar pit" was excavated and removed to the County Landfill. In addition, the soil surrounding the area had been disked. This implies aeration of the soil that would have assisted in the removal of Volatile Organic Compounds (VOCs). During the BSHW site visit, however, remains of the "tar pit" were still visible (Ref. 3).

Pesticides have been found in the soil between the two drum storage areas. The areal extent of the drum storage areas and contaminated soil is 174,240 square feet (Ref. 2).

4.2 Hazardous Waste Sources

The leaking drums onsite are the principal hazardous waste found. The on-site drums are clustered in two locations (Figure 2). During an October 27, 1986 site inspection by Ms. Laurie Goldner of the BSHW, contents from drums in the drum storage area were seen covering a portion of the concrete slab. The thickness of the spill was approximately 1 inch. Berms or other impounding structures were not present (Ref. 1). The location of this drum storage area was not mentioned in this report. However, several statements from other inspections lead to the conclusion that the drums are located at the northern drum storage area. During a site visit on July 1, 1987 materials leaking from the drums were observed to be flowing onto the ground (Ref. 1).

A third hazardous source area is known as the "tar pit". This area is located an estimated 300 ± 100 feet to the southwest of the southern drum area. This area was possibly associated with an old cannery operation that was on the site (Ref. 1). This source area is allegedly a fuel spill (Ref. 3). The area was excavated and removed to the county landfill (Ref. 2). However, during a BSHW site visit, scattered remnants of the "tar pit" were seen (Ref. 3).

A fourth area of concern are the pesticides in the soil between the two drum storage areas (Ref. 2).

4.3 Known and Suspected Contaminants of Concern

The material contained in the drums is mostly butadiene (R-45 Polymer) containing polybutadiene acrylic acid acrylonitrile (PBAN). However, aluminum powder, potassium chloride, 1-ethenyl-2-pyrrolidinone, acrylic acid-2-ethylhexyl ester and diethylamine are also contained in some of the drums (Ref. 3; Ref. 1). Of these chemicals aluminum is the only substance regulated under CERCLA. EPA TAT sampled 12 drums. The analyzed samples showed elevated levels of arsenic, barium, chromium, lead and silver (Ref. 4). Examination of the drum contents with gas chromatography and mass spectrography revealed four groups of organic compounds: polybutadienes, dimethyl alkylamines, phenyl alkyl naphthalamines and alkyl benzenes. Many of these compounds are carcinogenic and some can form toxic NO_x when heated (Ref. 3).

Acetone and 21 semivolatile compounds were detected in onsite soil samples, but not in background samples RD-SO-7 or RD-SO-7D (see table 4). Twelve pesticide compounds were detected in the soil samples. Nine pesticide compounds detected in onsite soil samples were not detected in the background samples. The concentrations of DDT, DDE and DDD that were detected in the soil samples were greater than three times the level found in the background samples.

Twenty-one inorganic analytes were detected in the soil samples. Beryllium and selenium were detected in nine samples, but not in the background samples. The concentrations of sodium found in nine samples were greater than three times the level detected in the background samples (see Table 5).

4.4 Previous Sampling Inspections

On January 18, 1990, the EPA Emergency Response Branch (ERB) and EPA's Technical Assistant Team (TAT) sampled the drum contents and inspected the site. The TAT collected product samples from 12 drums. The analyses of these samples indicate that elevated levels of arsenic, barium, chromium, lead, and silver may be associated with the drum contents (Ref. 4). In a letter from Michael Holmes of the ERB to John Rahkonen, Mr. Holmes indicated that the results of the analysis did not warrant further action by EPA's Removal Program, but recommended that steps be taken to reduce the fire hazard at the site (Ref. 2).

Sampling activities for the SI were conducted by Utah DERR on March 27, 1991. Soil, sediment, surface water and ground water samples were collected (Figure 2). Ground water samples were collected from three monitoring wells installed within the site boundaries (Table 1).

A surface water sample (RD-SW-03) was collected from a small ditch that flows from the "deep" irrigation well onsite. It appears that the water is flowing from the irrigation well by artesian pressure. The sediment sample (RD-SE-1) was taken from the same location as surface water sample RD-SW-03 (Table 2 and 3).

Fourteen soil samples were collected from seven locations at the RDS. Two samples were collected from each location, one sample was collected at 0-2 inches in depth and the other sample was taken at 6-12 inches in depth (Table 4 and 5). The samples from

each location were assigned the same sample number, except that the 6 - 12 inch samples were denoted with a "D".

Analytical results for the 3 ground water samples, 14 soil samples, 1 surface water sample and 1 sediment sample collected at RDS are summarized in Tables 1 through 5. All samples were analyzed for EPA Contract Laboratory Program (CLP) Target Compound List (TCL) analytes including volatiles, pesticides, PCBs and metals (Ref. 2).

5.0 GROUND WATER MIGRATION PATHWAY

5.1 Waste Source Containment

As outlined in Section 4.0, the hazardous waste sources are separated into four areas: two drum storage areas (north and south), an area of pesticide contaminated soil and the area known as the "tar pit". During a site visit in July 1987, materials leaking from the drums were seen flowing onto the ground. Berms or other impounding structures are not present in the areas where the drums are stored (Ref. 1). Remnants of the "tar pit" area were seen during a BSHW site visit (Ref. 3). Allegedly this was a fuel spill area, therefore, no liner was present (Ref. 2).

5.2 Likelihood of Release

Releases from the drums were documented on two site visits: October 22, 1986 and July 1, 1987. During the October 1986 visit an exposed area of concrete where drums are being stored was covered with materials from the drums to a depth of approximately 1 inch. During a site visit in July 1987, materials leaking from the drums were observed flowing onto the ground. Berms or other impounding structures are not present in the areas where the drums are stored and some of the drums in the northern storage area may rest on the bare ground (Ref. 1). Information detailing the area known as the "tar pit" is minimal. The contaminated soil was excavated and removed to the county landfill. The residuals of the fuel oil spill have congealed into hard tar like fragments (Ref.3). The water table is less than 12 feet below the surface.

5.3 Contaminants of Concern

The organic and inorganic analytical results from ground water sampling are presented in Table 1. 1,2-Dichloroethene (total) trichloroethene and tetrachloroethene were found in monitoring wells RD-MW-02, 03 and 04, but not in the designated background well RD-MW-01. The concentrations of these compounds are considered estimates.

Thirteen inorganic analytes were detected in the ground water samples. The background well, RD-MW-01, contained the highest concentrations of arsenic, iron, potassium and sodium. Copper and selenium were detected in RD-MW-01, but not in any other well. Lead was detected in RD-MW-02, but not in any other well.

5.4 Available Data Documenting a Release

Analysis of water level measurement data from three days in March and May, 1991 shows two opposing ground water flow directions. Water level data from March 10 and 27 show an east-northeast flow direction while the May 21 data indicate a southwesterly flow direction. The water level data show that RD-MW-01 is not hydraulically upgradient of the waste sources areas at the site, but cross-gradient.

A release to the ground water has not been established, due to the lack of attribution of ground water contaminants, other than lead, to known onsite wastes. Also, the location of the background well does not allow for documentation of upgradient water quality.

5.5 Targets

Brigham City obtains water from six springs and four deep wells (Ref. 1 and 8). The closest drinking water source is the Brigham City municipal well Cemetery Number 2. This well is 1.25 miles to the east-southeast of the site at about 400 South and 600 East. This well is screened at 620 feet in the alluvium and is replacing the nearby Cemetery Number 1 well, which is screened at 420 feet. The second closest drinking water well is the Cooley Well 1.5 miles to the east-northeast. This well is screened at 402 feet. The other deep drinking water source wells are referred to as the Mantua Wells located 4.5 miles to the southeast in the Wellsville Mountains. The six springs are located around Mantua and Mantua Reservoir five miles east of the site in the Wellsville Mountains. Two other wells are present in Brigham City, the golf course well 1.5 miles to the northeast,

and the city's irrigation well 1.5 miles to the southeast of the site at the Intermountain Indian School (Ref. 8). The town of Perry has four drinking water wells; 3 to 3.5 miles to the south that supply water to 1,211 residents.

An irrigation well exists at RDS and is owned by the property (Ref. 2). There are no wellhead protection areas in Utah.

5.6 Data Gaps

The number, thickness and water quality of the aquifers under the site have not been thoroughly evaluated. Monitoring well RD-MW-01 likely does not represent upgradient water quality. From the limited information available on the ground water flow direction, there are no background (upgradient) wells onsite. All maps are approximate sketches that are not to scale. Table 1 of Reference 2 lists seven monitoring wells at RDS. No information exists as to the locations of monitoring wells RD-MW-04, 05, 06 and 07. Nor is there any information as to whether any of these wells were ever sampled.

6.0 SURFACE WATER OVERLAND/FLOOD MIGRATION PATHWAY

6.1 Waste Source Containment

Run-on/run-off control structures are not present in the four hazardous waste sources areas: two drum storage areas, an area of pesticide contaminated soil and the area known as the "tar pit" (Ref. 1). The drums in the south drum storage area rest on a "cement" slab. A "cement" slab also extends under most, if not all of the northern drum storage area. During a site visit in July 1987, materials leaking from the drums were seen flowing onto the ground.

6.2 Likelihood of Release

There is a potential for contaminants migrating off-site through the surface water migration pathway. The irrigation well onsite has an artesian head during part of the year and flows westerly into a ditch. This ditch connects to a second ditch along the railroad right of way that drains to the southwest. The amount of water flow from this well is low and changes seasonally. There is a small amount of seasonal surface water (rainfall and snowmelt

runoff) leaving the site (Ref. 2). Run-off from the site could eventually reach Willard Bay approximately 4 to 6 miles downstream of the site (Figure 3) (Ref. 5).

During storm events contaminants found in the product pools around the leaking drums, and present in the surface soils could enter the surface water.

6.3 Contaminants of Concern

The organic analytical results from surface water and sediment sampling are presented in Table 2, inorganic results are presented in Table 3. Contaminants of concern in the surface water pathway are metals and six organic compounds that were detected in these samples.

6.4 Available Data Documenting a Release

The only organic compound detected in the surface water sample RD-SW-03 was trichloroethene at 24 ppb. Arsenic, barium and lead were detected in both the surface water and drums; their presence in the surface water may be attributable to the site. Tichloroethene was not detected in the sediment sample. Five organic compounds and nine inorganics were detected in the sediment sample. None of the inorganics in the sediments appear to be elevated relative to the background levels in soil. Three organics were detected in both the sediment and soil samples (acetone, 4-methylphenol, bis(2-ethylhexyl) phthalate. However, the sediment results are flagged as estimates and it is not known if the quality control were adequate to document an observed release.

Since the ditch flows originates onsite from the irrigation well outflow comparison of these sample results to a background or upstream sample is not necessary to show an observed release.

6.5 Targets

Surface water is not used for potable purposes within the target distance limit of the site. It may be used for irrigation and may also serve as a source of water for wildlife (Ref. 1). The nearest wetland is located approximately 1 mile downgradient of the site. Additional wetlands are located west of the site. The Bear River Migratory Bird Refuge is about 9 miles west-southwest and downstream of the site (Ref. 3). The Harold S. Crane

Waterfowl Management Area is located approximately 12 miles southwest and downstream of the site (Ref. 5). Both the bird refuge and the waterfowl area are located in Willard Bay of the Great Salt Lake. These features are illustrated in Figure 3 (Ref. 5).

6.6 Data Gaps

Stream flow for either ditch is not known. Flood plain information is lacking. It is not known if fishing or recreational use of either ditch occurs. The location and length of wetlands along the 15-mile downstream target distance limit has not been determined.

7.0 GROUND WATER TO SURFACE WATER MIGRATION PATHWAY

7.1 Waste Source Containment

Berms or other impounding structures are not present (Ref. 1) in the four hazardous waste source areas: two drum storage areas, an area of pesticide contaminated soil and the area known as the "tar pit". The drums in the south drum storage area rest on a "cement" slab. A "cement" slab also extends under most, if not all of the north drum storage area. The other two locations were uncontrolled spill areas; therefore, no liner exists beneath these two locations. During a site visit in July 1987, materials leaking from the drums were seen flowing onto the ground (Ref. 1).

7.2 Likelihood of Release

The artesian well that flows into the onsite ditch is a likely pathway for a ground water to surface water release.

7.3 Contaminants of Concern

The contaminants of concern for this migration pathway are lead, trichloroethene, tetrachloroethene and 1,2-dichloroethene.

7.4 Available Data Documenting a Release

The lead detected in RD-MW-02 may qualify as an observed release to the ground water migration pathway. Trichlorethene, tetrachloroethene and 1,2-dichloroethene detected in RD-MW-02 and RD-MW-03 have not been attributed to the site.

Other contaminants detected in the sediment and surface water samples were not present in ground water at concentrations that qualify as observed releases and therefore do not document an observed release to this migration component. Only surface water threats that result from migration of hazardous substances from a source at the site to surface water via ground water can be considered.

7.5 Targets

The targets are the same as those discussed in Section 6.5.

7.6 Data Gaps

It is not known if a ground water to surface water conduit exists between the site and the pond/spring downgradient of the site. No data have been collected from the pond/spring area. Insufficient information exists on the physical properties of the aquifers, the direction of ground water flow, and whether a seasonal change in the direction occurs.

8.0 SOIL EXPOSURE PATHWAY

8.1 Waste Source Containment

Superficially contaminated soil exists in each of the four areas known to be contaminated. During a site visit in July 1987, materials leaking from the drums were seen flowing onto the ground (Ref. 1).

The site is surrounded by a fence. The east, north and south borders of the site are enclosed with a 6-foot chain link fence. The west side of the property is fenced with a 3-foot barbed wire fence (Ref. 3). There is a potential for direct contact because the gate (at RDS) is left open and unguarded during the day. At night the gate is locked.

8.2 Likelihood of Release

The visual observations and soil sampling results indicate that there has been release of contaminants to the soil (Tables 4 and 5).

8.3 Contaminants of Concern

Contaminants of concern for soil exposure include acetone, beryllium, selenium, sodium, nine pesticide compounds and 21 semivolatile compounds. Arsenic, barium, chromium, lead and silver detected in drums also may be of concern.

8.4 Available Data Documenting a Release

Inspection reports from the BSHW visits, and the PA and SI document observed soil contamination at three locations onsite: the area known as the "tar pit", contaminated soil between the drum storage areas and the northern drum storage area. Analytical results for the soil samples were summarized in Section 4.3.

8.5 Targets

The population within 1 mile of the site is approximately 9,500. There are approximately 15 onsite workers (Ref. 2). Box Elder High School is located approximately 1500 feet to the southeast of the site (Ref. 7). Corn has been grown onsite. Whether the corn was used for human consumption or for fodder is not known (Ref. 2).

8.6 Data Gaps

It is not known if terrestrial sensitive environments are found onsite. The use of the corn grown onsite is not known. Descriptions of soil sample locations S-5, S-3 and S-6 are in question, due to conflicting documentation.

9.0 AIR MIGRATION PATHWAY

9.1 Waste Source Containment

All of the four source areas are exposed to the atmosphere. There are no wind breaks or covers surrounding the area of concern (Ref. 2).

9.2 Likelihood of Release

All of the contaminants found in surface soil samples are available for gaseous and/or particulate transport. The materials being stored at the site are ignitable. A fire at another drum site owned and operated by Mr. John Rahkonen, involving the same type of materials, has demonstrated the ignitable nature of such materials. When the materials are burned, copious amounts of thick, black acrid smoke is generated. Moderately toxic substances may also be released and become airborne with the smoke while these materials burn. Many of the drums are leaking (Ref. 1).

9.3 Contaminants of Concern

The materials contained in the drums are mostly R-45 Polymer containing polybutadiene acrylic acid acrylonitrile (PBAN). However, aluminum powder, potassium chloride, 1-ethenyl-2-pyrrolidinone, acrylic acid-2-ethylhexyl ester and dictylamine are also contained in some of the drums (Ref. 1; Ref. 3). Examination of the drum contents with gas chromatography and mass spectrography revealed four groups of organic compounds: polybutadienes, dimethyl alkylamines, phenyl alkyl naphthalamines and alkyl benzenes. Many of these compounds are carcinogenic and some can form toxic NO_x when heated (Ref. 3).

In addition to the potential for combustion of the drums contents, the contaminants found in surface soil samples (Tables 1 through 5) are prone to wind transport (Ref. 2). Contaminants found in the soil samples include acetone, beryllium, selenium, sodium, nine pesticide compounds and 21 semivolatile compounds.

9.4 Available Data Documenting a Release

An airborne release has not been documented for the site. The potential for a release occurred during a fire in the area known as the "tar pit" in 1984 (Ref. 3).

9.5 Targets

Onsite workers total 15. An estimated 605 people reside within $\frac{1}{4}$ mile of the site, 1,785 people reside within $\frac{1}{4}$ - $\frac{1}{2}$ mile of the site, 7,110 within $\frac{1}{2}$ -1 mile, 8,500 within 1-2 miles; and 1,200 within 2-3 miles of the site. The numbers of persons residing within 200 feet and within 3-4 miles of the site are not known. Box Elder High School is located approximately 1500 feet to the southeast of the site. Central School is located 3,500 feet to the east-southeast.

9.6 Data Gaps

Air samples have not been collected to determine if volatiles or particulates are being released to the air onsite or transported off-site. There is no information on wind speed and direction for RDS. The vegetative status of the site is not known.

10.0 SUMMARY

The Rahkonen Drum Site (RDS) is located along the western edge of Brigham City, Utah. RDS covers approximately 8 acres, most of which is open fields and old buildings. The site was used in the cannery business and later for cabinet production. Currently the site is used for drum storage of surplus materials purchased from Morton Thiokol, and for a brine shrimp operation and a welding shop.

The hazardous waste sources are separated into four areas: two drum storage areas (north and south), an area of pesticide contaminated soil and the area known as the "tar pit". Drum storage began in 1983. The drums are located in two areas onsite. A north area contains approximately eight hundred 55-gallon drums stacked two high on wooden pallets on a "cement" slab. Many of these drums in the north area were oozing a black, tarry substance in 1990. Some of the seventy-five 55-gallon drums in the south areas were bulging and corroded. Mr. Rahkonen claims the material stored in the drums

include butadiene (R-45 polymer), aluminum powder, potassium chloride, 1-ethylene-2-pyrrolidinone, acrylic acid-2-ethylhexyl ester and dioctylamine. Labels on these drums also include: 2-ethylhexyl acrylate, tone polyol, HD calcium grease, dioctyl adipate, insulating electrical oil, Exxon turbo oil, N-Vinyl-2-pyrrolidone, and Union Carbide molecular sieves.

The "tar pit" is an alleged fuel spill that occurred during the cannery operation. None of the areas onsite are impounded or lined. According to the owner the "tar pit" was removed to the County Landfill. Remnants of the "tar pit" were still visible during a BSHW site visit.

Soil sample data indicate releases of acetone, beryllium, selenium, sodium, nine pesticide compounds and 21 semivolatile compounds to the soil exposure pathway. Ground water sample data indicate possible release of three volatile organic compounds and lead to the ground water migration pathway. Sediment and surface water sample data show releases of six organic compounds and 14 metals to the surface water migration pathway.

Ground water is located less than 12 feet below ground surface. The permeability of the soil is low. The municipal wells of Brigham City and Perry, Utah are within four miles of the site. The nearest drinking water source is 1.25 miles to the east. Approximately 8,226 persons use ground water as a drinking water source within 3 miles of the site.

Surface water in the area of the site is not used for potable purposes. It may be used for irrigation and may also serve as a source of water for wildlife. An artesian well onsite drains through a ditch to a second ditch along the railroad tracks. A wetland is located approximately 1 mile downgradient of the site. Additional small wetlands are located west of the site. The Bear River Migratory Bird Refuge is about 4 miles west-southwest and downstream of the site. The Harold S. Crane Waterfowl Management Area is located approximately 12 miles southwest and downstream of the site. Both the bird refuge and the waterfowl area are located in Willard Bay of the Great Salt Lake.

Areas of soil contamination at the site are not covered, and therefore, exposed to wind transport. The site is surrounded by a fence. However, the gate is left open and unguarded during the day, allowing access to the site. An estimated 9,500 people reside within one mile of the site.

Contaminants detected onsite can be transported either by gaseous or particulate migration. Most of the materials being stored onsite are ignitable. Toxic to moderately toxic substances may be released and become airborne if the contents in the drums are ignited. Fifteen people work onsite. A high school is located 1500 feet to the southeast of the site. An estimated 605 people reside within $\frac{1}{4}$ mile of the site, 1,785 people reside within $\frac{1}{4}$ - $\frac{1}{2}$ mile of the site, 7,110 within $\frac{1}{2}$ -1 mile, 8,500 within 1-2 miles and 1,200 within 2-3 miles of the site.

References

1. Utah Department of Health, Bureau of Solid and Hazardous Waste, Preliminary Assessment, Rahkonen Drum Site, Brigham City, Utah, UTD981545981 (Final), October 15, 1987
2. Utah Division of Environmental Response and Remediation, Analytical Results Report, Rahkonen Drum Site, Brigham City, Utah, UTD98154598 (Draft), August 22, 1991
3. Utah Department of Health, Bureau of Solid and Hazardous Waste, Sampling Plan, Rahkonen Drum Site, Brigham City, Utah, UTD98154598 (Final), October 29, 1990
4. Utah Bureau of Environmental Response and Remediation, Field Activities Report, Rahkonen Drum Site, Brigham City, Utah, UTD98154598 (Draft), June 17, 1991
5. U.S. Geological Survey, 30 X 60 Minute Quadrangle, Promontory Point, Utah, 1987
6. U.S. Department of Commerce, NOAA Atlas 2, Precipitation-Frequency Atlas of the Western United States, Volume VI-Utah, 1973
7. U.S. Geological Survey, 7½ minute topographic maps, Brigham City, Utah (1955, 1969 and 1988) and Willard, Utah (1992)
8. Record of Communications, Between Robert J. Melvin (ICF) and Mr. Blair Blonquist (Brigham City Water Division), March 29, 1993



ICF TECHNOLOGY
INCORPORATED

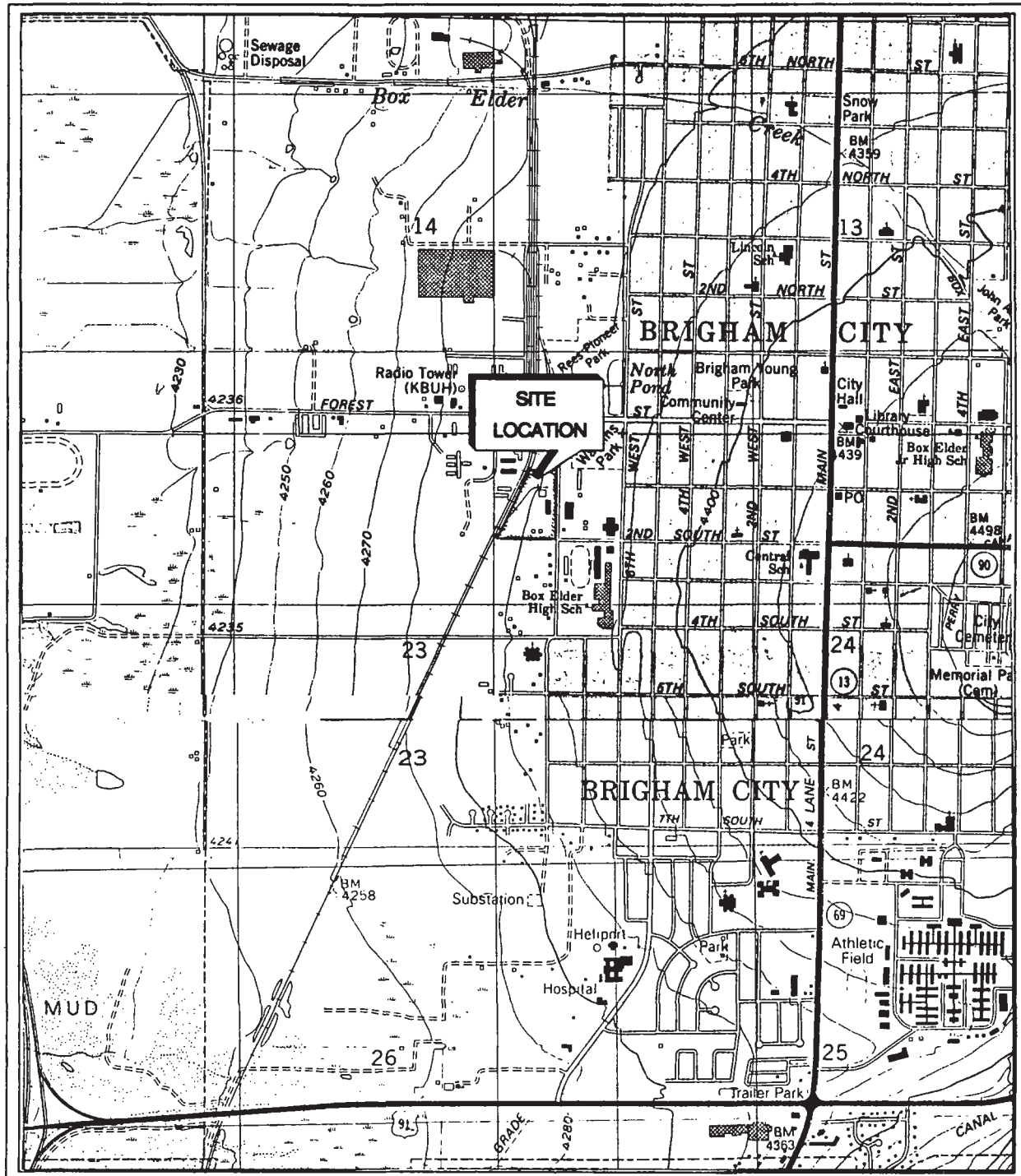


Figure 1

SITE LOCATION MAP

Rahkonen Drums
Brigham City, Utah

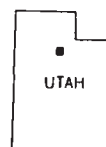
CERCLIS No. UTD881545961

Source: Brigham City and Willard,
USGS Topographic Map

1000 0 1000 2000 FEET



SCALE 1:24 000



QUADRANGLE LOCATION

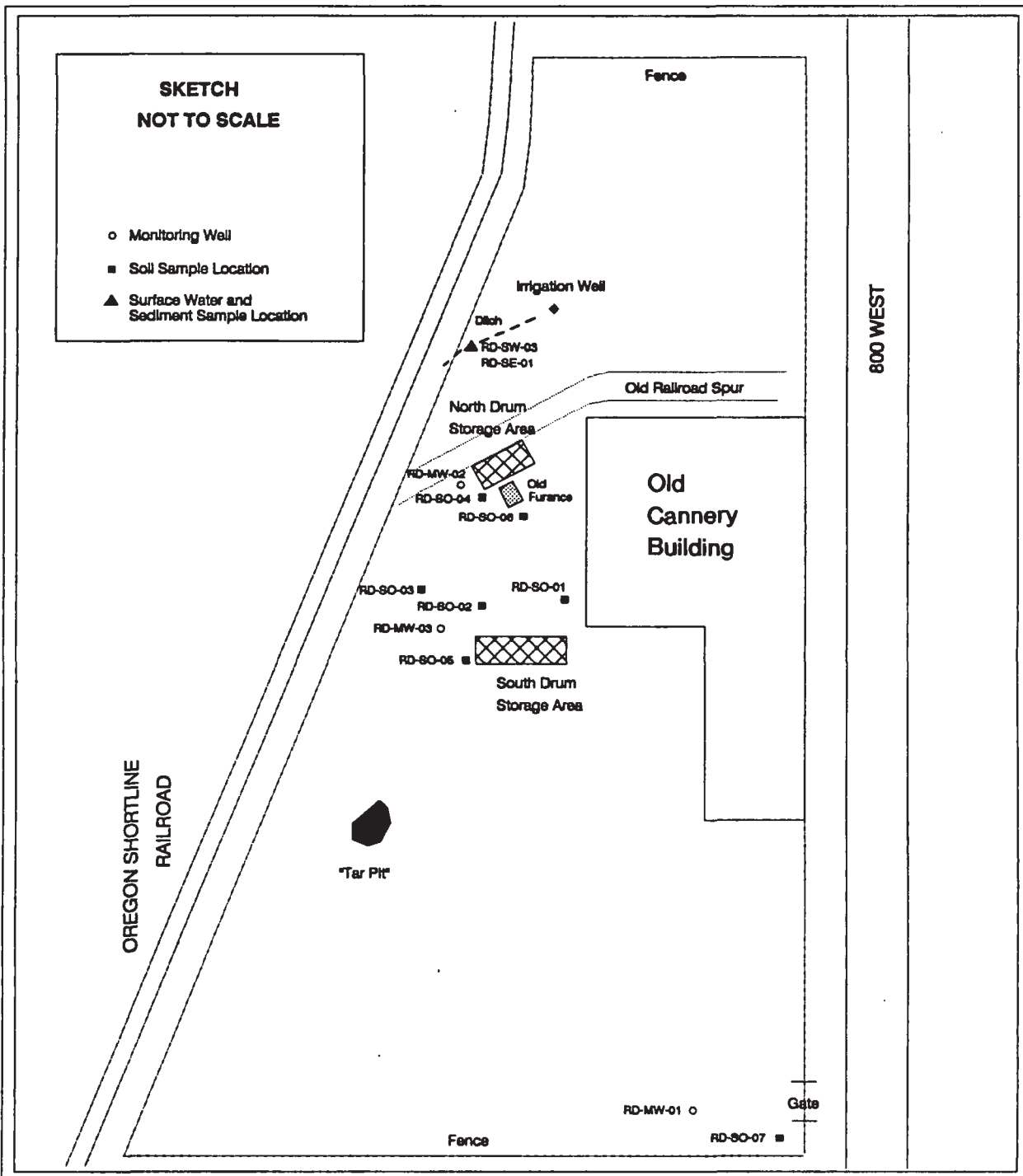


Figure 2

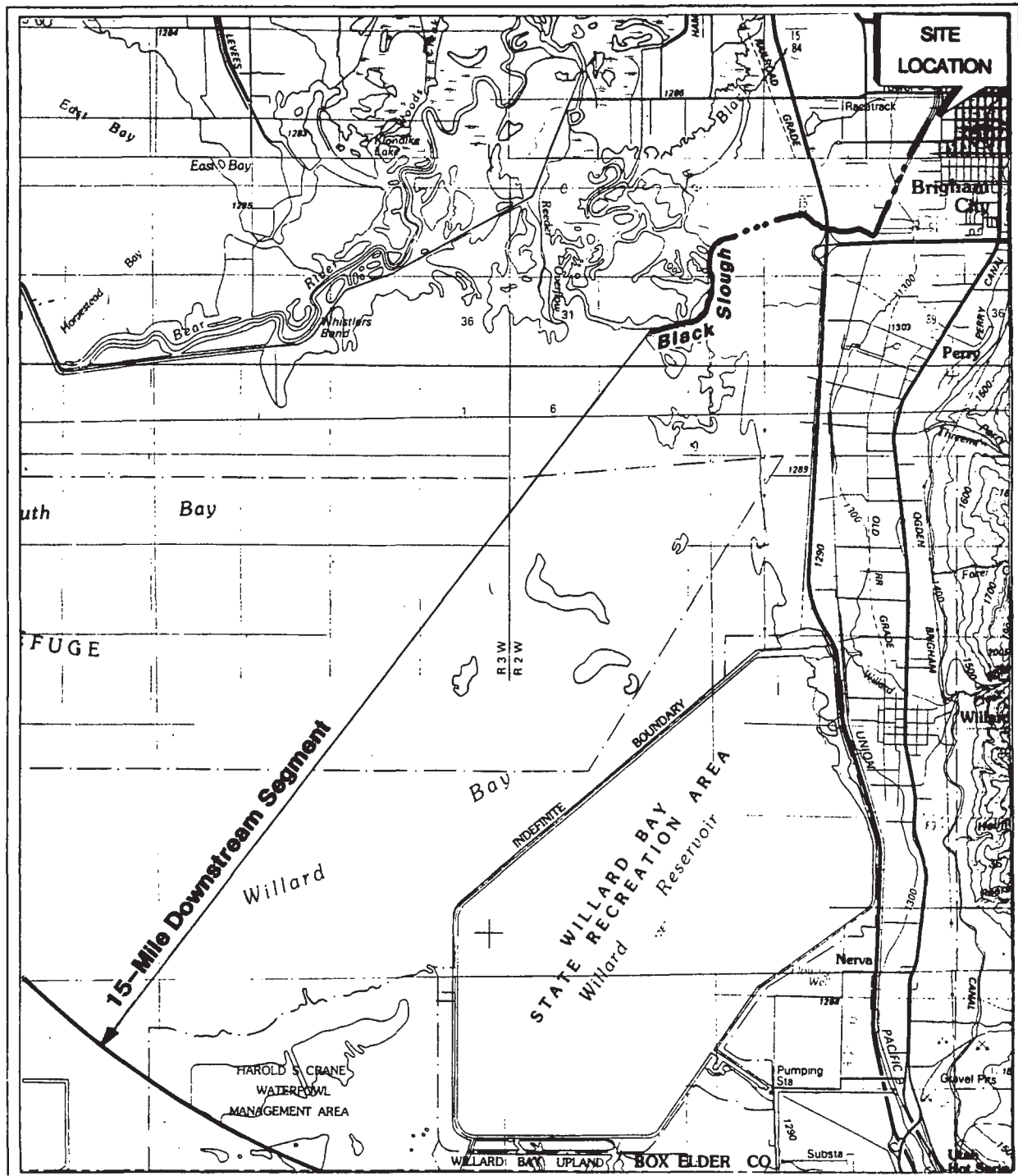
Source Reference 2



SITE SKETCH

Rahkonen Drums
Brigham City, Utah

CERCLUS No. UTD981545981



Source Reference 5

Figure 3

15-MILE DOWNSTREAM SEGMENT MAP

Rahkonen Drums
Brigham City, Utah

CERCLIS No. UTD981545981



MILES 1 0 1 2 3



QUADRANGLE LOCATION

TABLE 1
ORGANIC AND INORGANIC ANALYSES OF GROUND WATER SAMPLES
Rahkonen Drum Site, Brigham City, Utah

Sample Number	RD-MW-01	RD-MW-02	RD-MW-03	RD-MW-04
VOLATILES				
1,2 Dichloroethene (total)	ND	6J	9J	10J
Trichloroethene	ND	1,800J	1,500J	1,600J
Tetrachloroethene	ND	210J	210J	190J
SEMIVOLATILES				
bis(2-Ethylhexyl)Phthalate	ND	ND	4J	ND
PESTICIDES				
Pesticides analyzed, none detected	ND	ND	ND	ND
INORGANICS				
Aluminum	ND	ND	ND	ND
Arsenic	113	1.6	ND	1.2
Barium	74.8	105	124	125
Calcium	46,200	82,200	99,200	99,600
Copper	5.6	ND	ND	ND
Iron	138	ND	ND	19.3
Lead	ND	1.1	ND	ND
Magnesium	19,300	23,100	24,700	24,700
Manganese	69	42.8	70.4	71.9
Potassium	7,380	3,040	6,540	6,670
Selenium	1.2	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	102,000	18,200	24,800	26,700
Vanadium	5.1	ND	5.2	ND
Zinc	8.1	18.3	7.2	19

Units are expressed in parts per billion (ppb)
RD-MW-04 = Duplicate sample of RD-MW-03
J = The associated numerical value is an estimate because:
1. The Quality Control criteria were not met, or
2. The amount detected in the sample is below the contract required detection limit - Organic analysis only.
ND = Not Detected
Reference 2

TABLE 2
ORGANIC ANALYSES OF SEDIMENT AND SURFACE WATER SAMPLES
 Rahkonen Drum Site, Brigham City, Utah

SEDIMENT	
SAMPLE NUMBER	RD-SE-01
VOLATILES	
Acetone	43.J
SEMIVOLATILE	
4-Methylphenol	590.J
bis(2-Ethylhexyl)phthalate	330J
Naphthalene	ND
2-Methylnaphthalene	ND
Dibenzofuran	ND
Phenanthrene	ND
Fluoranthene	ND
Pyrene	ND
Chrysene	ND
Benzo(b)Fluoranthene	ND
Benzo(a)Pyrene	ND
Benzo(g,h,i)Perylene	ND
Di-n-Octyl Phthalate	ND
Benzo(k)Fluoranthene	ND
Benzoic Acid	ND
Di-n-Butylphthalate	ND
Phenol	ND
2-Methylphenol	ND
2,4-Dimethylphenol	ND
N-Nitrosodiphenylamine (1)	ND
Benzo(a)Anthracene	ND
PESTICIDES	
4,4'-DDE	7.3.J
4,4'-DDT	11.J
Aldrin	ND
Methoxychlor	ND
Endosulfan II	ND
4,4'-DDD	ND
Dieldrin	ND
alpha-Chlordane	ND
gamma-Chlordane	ND
Endrin	ND
Endosulfan I	ND
gamma-BHC (Lindane)	ND
Heptachlor epoxide	ND

SURFACE WATER		
SAMPLE NUMBER	RD-SW-01	RD-SW-03
VOLATILES		
1,2 Dichloroethene (total)	ND	ND
Trichloroethene	ND	24.J
Tetrachloroethene	ND	ND
SEMIVOLATILES		
bis(2-Ethylhexyl)Phthalate	ND	ND
PESTICIDES		
Pesticides analyzed, none detected	ND	ND

RD-SW-01 = Trip Blank

Units are expressed in parts per billion (ppb)

J = The associated numerical value is an estimate because:

1. The Quality Control criteria were not met, or

2. The amount detected in the sample is below the contract required detection limit - Organic analysis only.

ND = Not Detected

Reference 2

TABLE 3
INORGANIC ANALYSES OF SEDIMENT AND SURFACE WATER SAMPLES
Rahkonen Drum Site, Brigham City, Utah

SEDIMENT	
SAMPLE NUMBER	RD-SE-01
Aluminum	6,570
Antimony	ND
Arsenic	9.4
Barium	155
Beryllium	ND
Cadmium	ND
Calcium	6,480
Chromium	9.6
Cobalt	3.9
Copper	39.7
Iron	11,400
Lead	41.8
Magnesium	2,860
Manganese	282
Mercury	ND
Nickel	ND
Potassium	1,830
Selenium	ND
Sodium	286
Vanadium	9.6
Zinc	125

Units are expressed in parts per million (ppm)
RD-SW-01 = Trip Blank
ND = Not Detected
Reference 2

SURFACE WATER	
SAMPLE NUMBER	RD-SW-01
Aluminum	ND
Arsenic	ND
Barium	1.2
Calcium	ND
Copper	ND
Iron	ND
Lead	ND
Magnesium	ND
Manganese	ND
Potassium	ND
Selenium	ND
Silver	ND
Sodium	56
Vanadium	ND
Zinc	ND

TABLE 4
ORGANIC ANALYSES OF SOIL SAMPLES
Rahkonen Drum, Brigham City, Utah

SAMPLE NUMBER	RD-SO-01	RD-SO-01D	RD-SO-02	RD-SO-02D	RD-SO-03	RD-SO-03D	RD-SO-04	RD-SO-04D
VOLATILE								
Acetone	ND	ND	19J	ND	17J	ND	ND	28J
SEMIVOLATILE								
4-Methylphenol	280J	2,000J	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	2,200J	ND	140J	ND	ND	ND	ND	ND
Naphthalene	ND	81J	ND	ND	720J	92J	1,100J	1,400J
2-Methylnaphthalene	ND	370J	ND	ND	810J	130J	1,400J	5,300J
Dibenzofuran	ND	ND	ND	ND	170J	ND	520J	900J
Phenanthrene	ND	370J	ND	ND	330J	81J	1,500J	2,300J
Fluoranthene	ND	ND	ND	ND	200J	ND	650J	560J
Pyrene	ND	97J	ND	ND	580J	ND	700J	4,100J
Chrysene	260J	ND	ND	91J	1,500	ND	800J	ND
Benzo (b) Fluoranthene	ND	84J	120J	110J	500J	ND	810J	2,300J
Benzo (a) Pyrene	ND	ND	ND	120J	ND	ND	280J	3,700J
Benzo (g,h,i) Perylene	ND	83J	ND	190J	ND	ND	960J	15,000J
Di-n-Octyl Phthalate	ND	ND	ND	170J	ND	ND	ND	ND
Benzo (k) Fluoranthene	ND	76J	ND	88J	ND	ND	ND	ND
Benzoic Acid	310J	ND	ND	ND	ND	ND	ND	ND
Di-n-Butylphthalate	250J	ND	ND	ND	ND	ND	ND	ND
Phenol	ND	83J	ND	ND	ND	ND	ND	ND
2-Methylphenol	ND	270J	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ND	1,100J	ND	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine (1)	ND	1,300J	ND	ND	ND	ND	ND	ND
Benzo (a) Anthracene	ND	ND	ND	ND	ND	ND	ND	ND

Units are expressed in parts per billion (ppb)

J = The associated numerical value is an estimate because:

1. The Quality Control criteria were not met, or

2. The amount detected in the sample is below the contract required detection limit - Organic analysis only.

ND = Not Detected

Reference 2

TABLE 4 (CONTINUED)
ORGANIC ANALYSES OF SOIL SAMPLES
Fahkonen Drum, Brigham City, Utah

SAMPLE NUMBER	RD-SO-01	RD-SO-01D	RD-SO-02	RD-SO-02D	RD-SO-03	RD-SO-03D	RD-SO-04	RD-SO-04D
PESTICIDES								
4,4'-DDE	210J	410J	160J	71J	470J	260J	160J	ND
4,4'-DDT	850J	1,300J	330J	100J	900J	800J	580J	49J
Aldrin	ND	ND	ND	ND	7.7J	ND	34J	ND
Methoxychlor	ND	ND	ND	180J	ND	ND	120J	ND
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	45J
4,4'-DDD	ND	ND	ND	ND	120J	180J	ND	94J
Dieldrin	21,000J	250J	8.2J	ND	ND	13J	ND	ND
alpha-Chlordane	ND	10J	4.2J	2.6J	43J	33J	ND	ND
gamma-Chlordane	ND	11J	4.8J	ND	33J	26J	ND	ND
Endrin	320J	ND	ND	ND	ND	ND	ND	ND
Endosulfan I	ND	5.9J	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor epoxide	ND	ND	ND	ND	8.6J	ND	ND	ND

Units are expressed in parts per billion (ppb)

J = The associated numerical value is an estimate because:

1. The Quality Control criteria were not met, or

2. The amount detected in the sample is below the contract required detection limit - Organic analysis only.

ND = Not Detected

Reference 2

TABLE 4 (CONTINUED)

ORGANIC ANALYSES OF SOIL SAMPLES
Rahikonen Drum, Brigham City, Utah

SAMPLE NUMBER	RD-SO-05	RD-SO-05D	RD-SO-06	RD-SO-06D	RD-SO-07	RD-SO-07D
VOLATILE						
Acetone	ND	24J	15J	ND	ND	ND
SEMIVOLATILE						
4-Methylphenol	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	ND	330J	160J	ND	ND	ND
Naphthalene	150J	ND	ND	ND	ND	ND
2-Methylnaphthalene	410J	ND	ND	ND	ND	ND
Dibenzofuran	87J	ND	ND	ND	ND	ND
Phenanthrene	250J	100J	ND	ND	ND	ND
Fluoranthene	130J	190J	ND	ND	ND	ND
Pyrene	220J	180J	ND	ND	ND	ND
Chrysene	280J	140J	ND	ND	ND	ND
Benzo (b) Fluoranthene	ND	250J	ND	ND	ND	ND
Benzo (a) Pyrene	ND	130J	ND	ND	ND	ND
Benzo (a,h,i) Perylene	1,700J	330J	ND	ND	ND	ND
Di-n-Octyl Phthalate	ND	ND	ND	130J	ND	ND
Benzo (k) Fluoranthene	ND	ND	ND	ND	ND	ND
Benzoic Acid	ND	ND	ND	ND	ND	ND
Di-n-Butylphthalate	ND	ND	ND	ND	ND	ND
Phenol	ND	ND	ND	ND	ND	ND
2-Methylphenol	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ND	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine (1)	ND	ND	ND	ND	ND	ND
Benzo (a) Anthracene	ND	140J	ND	ND	ND	ND

Units are expressed in parts per billion (ppb)

J = The associated numerical value is an estimate because:

1. The Quality Control criteria were not met, or
2. The amount detected in the sample is below the contract required detection limit - Organic analysis only.

ND = Not Detected

Reference 2

TABLE 4 (CONTINUED)

ORGANIC ANALYSES OF SOIL SAMPLES
Rahkonen Drum, Brigham City, Utah

SAMPLE NAMES	RD-S0-05	RD-S0-05D	RD-S0-06	RD-S0-06D	RD-S0-07	RD-S0-07D
PESTICIDES						
4,4'-DDE	31J	51J	150J	ND	210J	110J
4,4'-DDT	90J	51J	1,400J	510J	760J	1,100J
Aldrin	ND	ND	ND	ND	ND	ND
Methoxychlor	ND	ND	ND	ND	ND	ND
Endosulfan II	20J	ND	ND	ND	ND	ND
4,4'-DDD	40J	ND	ND	21J	61J	31J
Dieldrin	ND	25J	ND	3.1J	48J	ND
alpha-Chlordane	ND	ND	4.4J	ND	ND	ND
gamma-Chlordane	ND	ND	5.3J	ND	ND	2.7J
Endrin	ND	ND	ND	ND	ND	ND
Endosulfan I	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)	ND	ND	2.3J	ND	ND	ND
Heptachlor epoxide	3.5J	ND	ND	ND	ND	ND

Units are expressed in parts per billion (ppb)

J = The associated numerical value is an estimate because:

1. The Quality Control criteria were not met, or
2. The amount detected in the sample is below the contract required detection limit - Organic analysis only.

ND = Not Detected

Reference 2

TABLE 5
INORGANIC ANALYSES OF SOIL SAMPLES
Rahkonen Drum Site, Brigham City, Utah

Sample Number	RD-SO-01	RD-SO-01D	RD-SO-02	RD-SO-02D	RD-SO-03	RD-SO-03D	RD-SO-04	RD-SO-04D
Aluminum	4,920	4,410	8,240	7,980	7,030	6,320	4,300	3,100
Antimony	ND	ND	8.2	ND	ND	ND	ND	ND
Arsenic	2.4	2.3	2.1	2.1	2.3	2.5	4	2.5
Barium	142	112	179	204	205	158	213	105
Beryllium	ND	0.51	0.61	0.57	0.59	0.57	0.59	0.53
Cadmium	0.98	ND	1.8	ND	ND	ND	1.4	0.85
Calcium	10,200	6,340	22,500	6,950	9,240	7,180	5,200	6,550
Chromium	9.8	12.1	15	7.6	9.9	8.1	9	7.4
Cobalt	3.9	3.1	4.6	3.3	3.3	3.5	3.7	2.8
Copper	47.9	34.8	25	20.4	37.2	33.3	42.6	23.8
Iron	8,800	6,510	10,400	8,390	8,850	8,680	8,620	6,880
Lead	67.8	49.6	78.9	55.6	65.1	48.1	72	39.8
Magnesium	2,250	1,10	2,410	2,240	2,390	2,010	2,360	2,080
Manganese	131	96.2	115	87.3	130	110	165	107
Mercury	0.27	ND	ND	ND	ND	ND	0.13	ND
Nickel	6.8	6.4	11.4	5.1	8.8	6.3	10.4	3.4
Potassium	1,180	1,420	1,150	1,320	1,890	1,960	1,120	870
Selenium	0.31	0.29	ND	0.25	0.34	0.4	0.68	0.41
Sodium	163	194	1,160	800	358	296	473	338
Vanadium	9.1	7.5	14	11.8	11.5	12.3	10.7	7.1
Zinc	267	183	519	82.3	175	146	349	155

Units are expressed in parts per million (ppm)
Reference 2

TABLE 5 (CONTINUED)
INORGANIC ANALYSES OF SOIL SAMPLES
Rahkonen Drum Site, Brigham City, Utah

Sample Number	RD-SO-05	RD-SO-05D	RD-SO-06	RD-SO-06D	RD-SO-07	RD-SO-07D
Aluminum	6,500	4,950	2,950	2,830	4,260	3,960
Antimony	10	ND	ND	ND	ND	7.9
Arsenic	2.5	2.3	1.4	1.1	4	2.2
Barium	246	130	30.2	38.2	86.8	61.6
Beryllium	0.57	0.56	ND	ND	ND	ND
Cadmium	0.92	ND	ND	ND	0.9	ND
Calcium	10,700	8,460	3,490	5,210	14,400	29,300
Chromium	7.3	7.2	5.4	5.5	68.2	9.1
Cobalt	3.7	3.5	1.7	2.3	3.5	3.5
Copper	37.3	17.4	11	9.5	27.2	17.1
Iron	8,930	11,100	4,280	4,290	8,280	8,110
Lead	28.4	20.5	31.8	23.3	221	95.4
Magnesium	2,800	2,010	1,900	1,700	5,620	5,080
Manganese	131	88.4	54.8	56	309	262
Mercury	ND	ND	ND	ND	ND	0.12
Nickel	9.9	8.5	3.9	5.1	9.5	7.2
Potassium	1,310	1,240	861	761	1,210	857
Selenium	0.36	0.33	ND	ND	ND	ND
Sodium	709	304	30.1	23.5	56.1	42.7
Vanadium	9.9	9.6	5	6.1	9.1	7.8
Zinc	146	78.1	192	132	218	147

Units are expressed in parts per million (ppm)
Reference 2

Preparer's Name: Mark Lunsford

Location: Brigham City, Utah

Site Name: Rahkonen Drums

Date: September 29, 1993

PA Worksheet

Appendix A

MAJOR CONSIDERATIONS

- A) DOES ANY QUALITATIVE OR QUANTITATIVE INFORMATION EXIST THAT MAY INDICATE AN OBSERVED RELEASE TO AIR, GROUND WATER, SOIL OR SURFACE WATER? Yes

Describe: Drums have leaked chemicals on the ground (Ref. 1).

- B) IF THE ANSWER TO #1 IS YES, IS THERE EVIDENCE OF DRINKING WATER SUPPLY CONTAMINATION OR ANY OTHER TARGET CONTAMINATION (i.e. food chain, recreation areas, or sensitive environments? Potential alleged

Describe: There is no evidence that any municipal drinking water supply has been contaminated. However, the site is near an agriculture area. Corn is grown onsite. Wildlife, including deer, have been seen on site. There are wetlands within 1 mile of the site and estuarine wetlands 2 miles from the site. (Ref. 2, part 3, Section II of EPA site Inspection Form).

- C) ARE THERE SENSITIVE ENVIRONMENTS WITHIN A 4-MILE RADIUS OR 15 DOWNSTREAM MILES OF THE SITE? Yes IF YES, DESCRIBE IF ANY OF THE FOLLOWING APPLY:

- Multiple sensitive environments? There are wetlands approximately 2 miles from the site. (Ref. 2).
- Federally designated sensitive environment(s)? The Bear River Migratory Bird Refuge is approximately 9 miles west-southwest of the site. The Bald Eagle and Peregrine Falcon are in the area. (Ref. 2).
- Sensitive environment(s) downstream on a small or slow flowing surface water body? Wetlands are present 1 mile to the east of the site (Ref. 2).

- D) IS THE SITE LOCATED IN AN AREA OF KARST TERRAIN? No

Describe: _____

- E) DOES THE WASTE SOURCE LIE FULLY OR PARTIALLY WITHIN A WELLHEAD PROTECTION AREA AS DESIGNATED ACCORDING TO SECTION 1428 OF THE SAFE DRINKING WATER ACT? No

Describe: _____

- F) DOES ANY QUALITATIVE OR QUANTITATIVE INFORMATION EXIST THAT PEOPLE LIVE OR ATTEND SCHOOL ON ONSITE CONTAMINATED PROPERTY? No

Describe: No one is reportedly living on site. Fifteen people do work on site. The nearest school (Box Elder High School) is 1500 feet to the southeast of the site (Ref. 3).

SITE INFORMATION

1. SITE NAME: Rahkonen Drums

ADDRESS: 112 South 800 West

CITY: Brigham City COUNTY: Box Elder STATE: Utah ZIP: 84302

EPA ID: UTD981545981

LATITUDE: 41°30'34.7"

LONGITUDE: 112°01'38.9"

2. DIRECTIONS TO SITE (From nearest public road):

Take Interstate Highway 15 to Brigham City exit. Drive east on U.S. Route 89 to Main Street. Turn left and drive north on Main Street to 2nd South Street. Turn left and drive west on 2nd South Street to 800 West Street. Turn right and drive north on 800 West Street approximately half a block. The site is on the left (west).

3. SITE OWNERSHIP HISTORY (Use additional sheets, if necessary):

A. Name of current owner: Arnold R. Thompson

Address: 753 Sunset Drive

City: Brigham City County: Box Elder STATE: Utah ZIP: 84302

Dates: From: Unknown To: Unknown Phone: (801) 723-7894

B. Name of previous owner: Unknown

Address _____

City: _____ County: _____ State: ____ Zip: _____

Dates: From _____ To _____ Phone: _____

Source of ownership data: (Ref. 1).

4. TYPE OF OWNERSHIP (Check all that apply):

☒ Private ☐ State ☐ Municipal
☐ Federal ☐ County ☐ Other (describe): _____

5. NAME OF SITE OPERATOR: John Rahkonen
- ADDRESS: 2766 North 1050 East
- CITY: Ogden COUNTY: Unknown STATE: Utah ZIP: 84404
- PHONE: (801) 782-7714

BACKGROUND/OPERATING HISTORY

6. DESCRIBE OPERATING HISTORY OF SITE:

In the past the RDS site was a cannery operation. An alleged fuel spill occurred in an area known as the "tar pit" during the cannery operation. This "tar pit" caught fire in September 1984. The buildings on-site have been used by Concept Industries and Associated Manufacturing. A brine shrimp storage facility is temporarily located on site. Drum storage began in 1983 by Mr. Rahkonen. He buys the drums (which contain surplus materials) from Morton Thiokol, then resells the materials to interested parties under the business name Propulsion Dynamics.

Source of information: Ref. 3.

7. DESCRIBE SITE AND NATURE OF SITE OPERATIONS (property size, manufacturing, waste disposal, storage, etc.):

The site covers approximately 8 acres, most of which are open fields and old buildings used in a cannery business (thought to be in business in 1946). Railroad tracks parallel the rear of the property along the western boundary. A spur of the railroad crosses the northern half of the property. The U.S. Geological Survey 7½ minute topographic maps of the site (Brigham City, 1955, 1969 and 1988) show that the number, shapes and sizes of the buildings have increased and decreased through the years. Current operating activities at RDS include drum storage, storage of material used in a brine shrimp operation and a welding shop.

Source of information: Ref. 2.

8. DESCRIBE ANY EMERGENCY OR REMEDIAL ACTIONS THAT HAVE OCCURRED AT THE SITE:

On January 18, 1990, the EPA Emergency Response Branch and EPA's Technical Assistant Team (TAT) sampled the drum contents and inspected the site. The TAT sampled 12 drums. In a letter from Michael Holmes of the Emergency Response Branch (ERB) of the EPA to Mr. John Rahkonen, Mr. Holmes indicated that the results to the analysis did not warrant further action by EPA's Removal Program, if the drums were removed. The drums have not been removed.

Source of information: Ref. 2.

9. ARE THERE RECORDS OR KNOWLEDGE OF ACCIDENTS OR SPILLS INVOLVING SITE WASTES? Yes

Describe: On January 5, 1990, Suzanne Roll of the Utah Bureau of Solid and Hazardous Waste observed drums oozing a black tarry substance onto the ground around the base of the stacked drums. It was unclear whether all of the drums were on a "cement" slab or setting directly on soil because the pooled chemicals covered the base of the drums.

Source of information: Ref. 3.

10. DISCUSS EXISTING SAMPLING DATA AND BRIEFLY SUMMARIZE DATA QUALITY (e.g., sample objective, age/comparability, analytical methods, detections limits and QA/QC):

The analyses of 12 drum samples found elevated levels of arsenic, barium, chromium, lead and silver. The analysis also indicated the possibility of carcinogens associated with the drum contents. Samples collected of ground water, surface water and soil showed elevated levels of inorganics and a few organic compounds. The organic compounds are not found in the drums. EPA guidelines were followed. Holding times for soil and water VOA samples were met. Regulatory holding times were one day late for pesticides and volatile water samples. Most results were flagged "J" (estimated due to possible low bias). Instrument calibration for several components were outside the control limits for soil volatiles; below control limits for volatiles in water; and within limits for semivolatiles. Four out of ten spike recoveries were outside the control limits. However, four internal standards were outside the control limits. Overall data quality appears to be good.

Source of information: Ref. 2

WASTE CONTAINMENT/HAZARDOUS SUBSTANCE IDENTIFICATION

11. FOR EACH SOURCE AT THE SITE, SUMMARIZE ON TABLE 1 (page 12): 1) Methods of hazardous substance disposal, storage or handling; 2) size/volume/area of all features/structures that might contain hazardous waste; 3) condition/integrity of each storage disposal feature or structure; and 4) types of hazardous substances handled.
12. BRIEFLY EXPLAIN HOW WASTE QUANTITY WAS ESTIMATED (e.g., historical records or manifests, permit applications, air photo measurements, etc.):

The October 15, 1987 Final Preliminary Assessment Reports for Utah Power and Light Company lists the general contents of the drums found at site. Other organic chemicals (780-55 gallon drums), Inorganic Chemicals (4-55 gallon drums), acids (10-55 gallon drums) and Heavy Metals (5-50 gallon drums). The areal extent of the two drum storage areas and the pesticide contamination found between the two areas covers an estimated 174,240 square feet. This estimate was derived from site sketch maps.

The small "tar pit" was estimated to be about 50 square feet, from the examination of site sketch maps.

Source of information: Ref. 1.

13. DESCRIBE ANY RESTRICTIONS OR BARRIERS ON ACCESSIBILITY TO ONSITE WASTE MATERIALS:

The east, north and south borders of the site are enclosed with a 6-foot high chain-link fence. The fence has a gate which opens on to 800 West. The gate remains unguarded during the day and locked at night. The west side of the property has a 3-foot barbed-wire fence. Parallel to the west side of the property are the railroad tracks of the Union Pacific or Oregon Shoreline Railroad.

Source of information: Ref. 3.

GROUND WATER CHARACTERISTICS

14. ANY POSITIVE OR CIRCUMSTANTIAL EVIDENCE OF A RELEASE TO GROUND WATER?
Yes

Describe: On July 1, 1987, during a site visit, material was flowing from a drum onto the ground.

Source of information: Ref. 1.

15. ON TABLE 2 (page 13), GIVE NAMES, DESCRIPTIONS, AND CHARACTERISTICS OF GEOLOGIC/HYDROGEOLOGIC UNITS UNDERLYING THE SITE.

16. NET PRECIPITATION: 19 inches of precipitation - 50 inches of evaporation = -31 inches

Source of information: Ref. 3.

SURFACE WATER CHARACTERISTICS

17. ARE THERE SURFACE WATER BODIES WITHIN 2 MILES OF THE SITE? Yes

☒ Ditches ☐ Lakes ☒ Pond
☒ Creeks ☐ Rivers ☒ Other: Wetlands

18. DISCUSS THE PROBABLY SURFACE RUNOFF PATTERNS FROM THE SITE TO SURFACE WATERS:

A small secondary ditch on-site carries water to a ditch that runs parallel along the railroad tracks. This ditch may join downgradient with the Black Slough during flooding. The Black Slough empties into Williard Bay of the Great Salt Lake.

19. PROVIDE A SIMPLIFIED SKETCH OF SURFACE RUNOFF AND SURFACE WATER FLOW SYSTEM FOR 15 DOWNSTREAM MILES (see item #35).

20. ANY POSITIVE OR CIRCUMSTANTIAL EVIDENCE OF SURFACE WATER CONTAMINATION?
Yes

Describe: Five organic compounds were detected in a sediment sample from the ditch that originates onsite. Nine metals were detected in the sediment sample and in a surface water sample from the ditch. Chromium, cobalt, copper and vanadium were also detected in the sediment sample.

Source of information: Ref. 2.

21. ESTIMATE THE SIZE OF THE UPGRADIENT DRAINAGE AREA FROM THE SITE:
100 acres.

Source of information: Ref. 5.

22. DETERMINE THE AVERAGE ANNUAL STREAM FLOW OF DOWNSTREAM SURFACE WATERS

Water body: On-Site Ditch	Flow: 1	cfs	(estimated)
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Water body: Railroad Ditch	Flow: 2	cfs	(estimated)
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Water body: Black Slough	Flow: 10	cfs	(estimated)
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Source of information: Ref. 2.

23. IS THE SITE OR PORTIONS THEREOF LOCATED IN SURFACE WATER? No

Source of Information: Ref. 1.

24. IS THE SITE LOCATED IN A FLOODPLAIN (indicate flood frequency)? Unknown

Source of information: Ref. 2

25. IDENTIFY AND LOCATE (see item #35) ANY SURFACE WATER RECREATION AREA WITHIN 15 DOWNSTREAM MILES OF THE SITE:

Willard Bay State Recreation Area (Willard Reservoir) 6 to 13 miles southwest of RDS in Willard Bay, Great Salt Lake.

Source of information: Ref. 5

26. TWO YEAR 24-HOUR RAINFALL: 1.8 inches.

Source of information: Ref. 6.

TARGETS

27. DISCUSS GROUND WATER USAGE WITHIN FOUR MILES OF THE SITE:

The closest drinking water source is the Brigham City municipal well Cemetery Number 2. This well is 1.25 miles to the east-southwest of the site at about 400 South and 600 East. This well is replacing the nearby Cemetery Number 1 well. The second closest drinking water well is the Cooley Well 1.5 miles to the east-northeast. The other deep drinking water source wells for Brigham City are located 4.5 miles to the southeast in the Wellsville Mountains. The six springs are located around Mantua and Mantua Reservoir five miles east of the site in the Wellsville Mountains. Two non-drinking water wells are present in Brigham City. The golf course well 1.5 miles to the northeast, and the city's irrigation well 1.5 miles to the southeast of the site at the Intermountain Indian School.

The town of Perry has four drinking water source wells, these wells are three to 3.5 miles to the south.

Source of information: Ref. 8.

28. SUMMARIZE THE POPULATION SERVED BY GROUND WATER ON THE TABLE BELOW:

<u>Distance (miles)</u>	<u>Population</u>
>0 - 1/4	0
>1/4 - 1/2	0
>1/2 - 1	0
>1 - 2	2742
>2 - 3	0
>3 - 4	5484

There are 14 drinking water sources that supply Brigham City and Perry. The population of the target area is 19,200 people. Using a simple approximation, this means that each well or spring supplies water to 1,371 people. Six wells are in the target area, two between 1 and 2 miles, and four between 3 and 4 miles.

Source of information: Ref. 2 and 8.

29. IDENTIFY AND LOCATE (see item #35) POPULATION SERVED BY SURFACE WATER INTAKES WITHIN 15 DOWNSTREAM MILES OF THE SITE:

No surface water intakes are known to occur within 15 mile downstream target distance limit.

Source of information: Ref. 5.

30. DESCRIBE AND LOCATE FISHERIES WITHIN 15 DOWNSTREAM MILES OF THE SITE (i.e., provide standing crop of production and acreage, etc.):

No known fisheries occur within the 15 mile downstream distance limit.

Source of information: Ref. 5

31. DETERMINE THE DISTANCE FROM THE SITE TO THE NEAREST OF EACH OF THE FOLLOWING LAND USES:

<u>Description</u>	<u>Distance</u> (miles)
Commercial/Industrial/ Institutional	<u>0.1</u>
Single Family Residential	<u>0.25</u>
Multi-Family Residential	<u>0.25</u>
Park	<u>0.25</u>
Agricultural	<u>0.0</u>

Source of information: Ref. 2

32. SUMMARIZE THE POPULATION WITHIN A FOUR-MILE RADIUS OF THE SITE:

<u>Distance (miles)</u>	<u>Population</u>
onsite	15
>0 - 1/4	590
>1/4 - 1/2	1785
>1/2 - 1	7110
>1 - 2	8500
>2 - 3	1200
>3 - 4	Unknown

Source of information: Ref. 2

OTHER REGULATORY INVOLVEMENT

34. DISCUSS ANY PERMITS:

County: Unknown

State: Unknown

Federal: Unknown

Other: Unknown

Source of information: Ref. 1

35. SKETCH OF SITE

Include all pertinent features, e.g., wells, storage areas, underground storage tanks, waste areas, buildings, access roads, areas of ponded water, etc. Attach additional sheets with sketches of enlarged areas, if necessary.

See Figure 2

36. SURFACE WATER FEATURES

Provide a simplified sketch of surface runoff and surface water flow system for 15 downstream miles. Include all pertinent features, e.g., intakes, recreation areas, fisheries, gauging stations, etc.

See Figure 3

TABLE 1
WASTE CONTAINMENT AND HAZARDOUS SUBSTANCE IDENTIFICATION¹

SOURCE TYPE	SIZE (Volume/Area)	ESTIMATED WASTE QUANTITY	SPECIFIC COMPOUNDS*	CONTAINMENT ²	SOURCES OF INFORMATION
North Drum Storage Area	800 55-gallon drums	44,000 gallons	8 PAHs, naphthalene, 2-methylnaphthalene, Aldrin, Methoxychlor, Endosulfan II, beryllium, selenium, sodium	"Cement" slab	Ref. 3
South Drum Storage Area	75 55-gallon drums	4,125 gallons	9 PAHs plus 9 other semivolatile compounds, methoxychlor, Dieldrin Endrin, Endosulfan I, beryllium, selenium, sodium	"Cement" slab	Ref. 3
"Tar Pit"	50 ft ²	Unknown	Fuel spill	Removed to County Landfill	Ref. 1
Contaminated Soil	174,240 ft ²	174,240 ft ²	Pesticides Organic Chemicals	None	Ref. 2

*The materials contained in the drums is mostly R-45 Polymer containing Polybutadiene Acrylic Acid Acrylonitrile (PBAN); however, aluminum powder; potassium chloride, 1-ethenyl-2-pyrrolidinone; acrylic acid-2-ethylhexyl ester and diethylamine were found in some of the drums (Ref. 1; Ref. 3).

1 Use additional sheets if necessary.

2 Evaluate containment of each source from the perspective of each migration pathway (e.g., ground water pathway - non-existent, natural or synthetic liner, corroding underground storage tank; surface water - inadequate freeboard, corroding bulk tanks; air - unstabilized slag piles, leaking drums, etc.)

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TABLE 2
HYDROGEOLOGIC INFORMATION¹

STRATA NAME/DESCRIPTION	THICKNESS (ft.)	HYDRAULIC CONDUCTIVITY (cm/sec)	TYPE OF DISCONTINUITY ²	SOURCES OF INFORMATION
Aquifer System Undifferentiated	Unknown, (8,000 feet to bedrock)	Unknown, (10^{-4} to 10^{-8} cm/sec (Ref. 2, Appendix I))	Unknown	Ref. 3

¹ Use additional sheets if necessary.

² Identify the type of discontinuity within four-miles from the site (e.g., river, strata "pinches out", etc.)